CHAPTER 6

THRESHER-RUN LENTILS

CHAPTER 6

THRESHER-RUN LENTILS

6.1 DEFINITIONS

Thresher-Run Lentils. Lentils from which the dockage has not been removed.

Lentils. Threshed seeds of the lentil plant (Lens culinaris Moench) which after removal of the dockage contains 50.0 percent or more of whole lentils and not more than 10.0 percent foreign material.

6.2 FACTORS AND FACTOR DESIGNATIONS

Thresher-run lentils shall be inspected without reference to grade.

Thresher-run lentils may be inspected for the following factors: dockage, weevil-damaged lentils, heat-damaged lentils, damaged lentils, skinned lentils, split lentils, foreign material, inconspicuous admixture, color description, and moisture.

The factor designation for the class thresher-run lentils may include the percentage of dockage and type of sieve used in making the determination; the percentage of weevil-damaged lentils, heat-damaged lentils, damaged lentils, skinned lentils, split lentils, inconspicuous admixture, foreign material, and the computed total percentage thereof; the color description; and the percentage of moisture.

6.3 WORK RECORD

Record the results of all tests and findings clearly and accurately on a laboratory ticket or similar form. This will be used as the source of the information reported on the inspection certificate. FGIS personnel shall use either form FGIS-981, "Pea and Lentil Laboratory Ticket" or form FGIS-982, "Pea and Lentil Sample Ticket." Cooperators shall use a similar form.

6.4 REPRESENTATIVE PORTION

A specified quantity of lentils divided out from the representative sample by means of an FGIS-approved device.

6.5 WORK SAMPLE

A representative portion of lentils (approximate size - 1,000 grams) that is used to make all determinations required for the class Lentils.

6.6 FILE SAMPLE

a. A representative portion of lentils (approximate size - 1,000 grams) that may be used in conjunction with the work sample, when needed. File samples may also be used for monitoring, retest, and appeal inspection purposes.

b. Retain file samples in appropriate containers for the required retention period. After maintaining for the required period, dispose of the file samples in accordance with established procedures. See FGIS Directive 9170.13, "Uniform File Sample Retention System," for additional information.

6.7 PERCENTAGES

a. Percentages are determined on the basis of weight and are rounded as follows:

(1) When the figure to be rounded is followed by a figure greater than or equal to 5, round to the next higher figure; e.g., report 6.36 as 6.4, 0.35 as 0.4, and 2.45 as 2.5.

(2) When the figure to be rounded is followed by a figure less than 5, retain the figure; e.g., report 8.34 as 8.3 and 1.22 as 1.2.

b. Record factor results to the nearest tenth percent.

6.8 LABORATORY SCALES

Weigh samples and portions of samples using the proper class of FGIS-approved laboratory scales, and record the results to the correct division size. Use the following table to determine the scale class and division size required for weighing particular sized samples.

Table 1 - Laboratory Scales

Position Size	Scale Class	Maximum Division Size	Record Results to at Least the Nearest- -
120 grams or less	Precision	0.01 gram	0.01 gram
Samples for moisture determinations	Precision or Moisture	0.1 gram	0.1 gram
More than 120 grams	Precision, Moisture, or General	1 gram	1 gram

NOTE: See Chapter 2 of the Equipment Handbook for additional information.

6.9 PRELIMINARY EXAMINATION

a. The sampler must observe the uniformity of the lentils as to class, quality, and condition; make the determination for "Heating;" draw the representative sample; and report relevant information to the inspector.

b. The inspector must review the sampler's remarks/information. If the inspector has questions, or doubts the representativeness of the sample, he or she must contact the sampler and obtain the needed information or make arrangements to obtain another sample.

6.10 BASIS OF DETERMINATION

All factor determinations shall be made upon the basis of the lentils after the removal of dockage with the following exceptions:

Dockage shall be determined upon the basis of the thresher-run lentils as sampled.

Color shall be determined after the removal of dockage, defective lentils, and foreign material.

Defects in lentils shall be scored in accordance with the order shown in section

868.601(c). Once an individual lentil is scored in a defective category it shall not be scored for any other defect, but it shall remain as a part of the sample for purposes of determining the percentage of defects in the sample.

NOTE 1: When lentils that are offered for inspection as one lot are found to contain more than 10,000 containers or 1,000,000 pounds (bulk) of lentils, the lot must be sampled on the basis of two or more (approximately) equal-sized sublots of 10,000 containers or 1,000,000 pounds or less. Inspect each sublot separately.

NOTE 2: When lentils that are offered for inspection as one lot are subsequently found to contain portions that are distinctly different in quality, or condition, the lentils in each portion shall be inspected separately.

Follow a systematic factor examination procedure. The order of procedure may vary depending on the quality of the lentils and the tests that are requested. A general order of procedure is as follows:

(1) Review the information on the sample ticket.

(2) Examine the representative sample for odor, broken glass, and metal fragments.

(3) Use an FGIS approved divider to process the representative sample into two representative portions: a work sample and a file sample.

NOTE: For specific information on the operation and maintenance of dividers, see Chapter 7 of the Equipment Handbook.

(4) Remove the dockage from the work sample.

(5) Examine the work sample for distinctly low quality.

(6) Upon request, determine the percent of small lentils or other material that comprise the dockage. When this breakdown is not requested, determine the percent of total dockage.

(7) Upon request, divide out a 250-gram portion from the dockage-free portion and determine the percent of moisture.

(8) Divide out another 125-gram portion (or a 60-gram portion for small seeded lentils) from the dockage-free portion and determine the percent of defective lentils and foreign material.

(9) After removing the defective lentils and foreign material from the portion, examine the portion for color.

6.11 TOTAL DOCKAGE, DEFECTS AND FOREIGN MATERIAL

The percentage of total dockage, defective lentils and foreign material shall be combined and shown on the certificate as "Total Dockage, Defective Lentils, and Foreign Material."

a. Compute the percent of total defects and foreign material as follows:

(1) Determine the weight of the work sample.

(2) Determine the weight of the dockage in the work sample (e.g., 120 grams).

(3) Calculate the percent of dockage (e.g., 120 g) 1000 g = 12 %).

(4) Calculate the percent of dockage-free lentils (e.g., 100 % - 12 % = 88 %).

(5) Determine the weight of the defective lentils and foreign material portion (e.g., 125 grams).

(6) Determine the weight of the defective lentils and foreign material (e.g., 12.5 grams).

(7) Calculate the percentage of defective lentils and foreign material (e.g., 12.5 g) 125 g = 10 %).

(8) Adjust the percentage of defective lentils and foreign material by the base (e.g., 10 % x 88 % = 8.8 %).

(9) Calculate the percentage of total defects and foreign material (e.g., 12 % + 8.8 % = 20.8 %).

b. Record the percent of "total dockage, defective lentils, and foreign material" on the work record and the certificate to the nearest tenth percent.

6.12 MOISTURE

Moisture content shall be determined by the use of equipment and procedures set forth in the Equipment Handbook or by any method that gives equivalent results.

a. Upon request or when deemed necessary, determine moisture on a representative portion of exactly 250 grams of lentils after the removal of dockage.

b. Refer to Chapter 5 of the Moisture Handbook for information about determining moisture using the Motomco moisture meter.

NOTE: If a representative portion of the original sample of thresher-run lentils was not placed in a moisture-proof container at the time of sampling, promptly do so upon arrival at the laboratory. Seal the container with a friction or screw-top lid to preserve the moisture. The use of open containers, paper containers, and similar containers for holding moisture samples is prohibited.

c. Record the percent of moisture on the work record to the nearest tenth percent. Upon request or when the result is in excess of 14.0 percent, show the percent of moisture on the certificate to the nearest tenth percent.

6.13 ODOR

a. Determine odor on the basis of the lot as a whole or the representative sample as a whole.

(1) Off-odors (i.e., musty, sour, and commercially objectionable odors) are usually detected at the time of sampling.

(a) If there is any question as to the odor when the sample is being taken, put part of the sample into an airtight container to preserve its condition

for further examination in the laboratory.

(b) Return the portion to the sample before other tests are made.

(2) A musty odor shall be any odor that is earthy, moldy, and ground-like. Do not confuse a burlap bag odor with a musty odor.

(3) A sour odor shall be any odor that is rancid, sharp, or acrid.

(4) A commercially objectionable odor shall be any odor that is not normal to lentils and that, because of its presence, renders the lentils unfit for normal commercial usage; e.g., animal hides, fertilizer, oil products, skunk, smoke, fire-burnt, and decaying animal and vegetable matter odors.

(5) Fumigant or insecticide odors are considered commercially objectionable odors if they linger and do not dissipate. When a sample of lentils contains a fumigant or insecticide odor that prohibits a determination as to whether any other odor(s) exists, apply the following guidelines:

(a) Original Inspections. Allow the work portion to aerate in an open container for a period not to exceed 4 hours.

(b) Appeal and Board Appeal Inspections. Allow unworked file samples and new samples to aerate in an open container for a period not to exceed 4 hours. The 4-hour aeration requirement does not apply when the original work portion was aerated and retained as the final file.

(c) Final Action. Consider the sample as having a commercially objectionable odor if the fumigant or insecticide odor persists based on the above criteria.

b. When lentils are determined to be musty, sour, or have a commercially objectionable odor, record the type of odor on the work record and in the ARemarks@ section of the certificate.

6.14 HEATING

a. Determine heating on the basis of the lot as a whole.

(1) When high temperatures develop in lentils as the result of excessive respiration, such lentils are heating.

(2) Heating lentils usually give off a sour or musty odor.

(3) Care should be taken never to confuse lentils that are warm due to storage in bins, cars, or other containers during hot weather with lentils that are heating from excessive respiration.

b. When applicable, show the term "Heating" on the work record and in the ARemarks@ section of the certificate.

6.15 DOCKAGE

Dockage. Small, underdeveloped lentils, pieces of lentils, and all matter other than lentils which can be readily removed by use of sieves and cleaning devices as set forth in the inspection handbook for dry peas, split peas, and lentils.

a. Determine dockage on a representative portion of approximately 1,000 grams.

b. Remove the dockage from the lentils by sieving the representative portion with the appropriate size sieve.

NOTE: If official personnel determine that the prescribed sieve removes too many small, fully developed lentils (not screenings), they may elect to use a slightly smaller sieve. Furthermore, if they determine that the prescribed sieve allows too many underdeveloped lentils to remain with the "clean" lentils, they may elect to use a slightly larger sieve.

Table 2 - Prescribed Sieves	
Types	Sieves
Regular Lentils	12/64 - inch Round-Hole
Small Lentils	9/64 - inch Round-Hole

(1) Nest the sieve on top of a bottom pan.

(2) Place the sieve in a mechanical grain sizer and set the timer to 20.

(3) Put one-third of the representative portion in the center of the sieve and actuate the sizer.

NOTE: If a mechanical sizer is unavailable, hold the sieves and bottom pan level and, using a steady motion, move the sieves from right to left approximately 10 inches, and return from left to right to complete one sieving operation. Repeat this operation twenty times.

(4) Return the material remaining in the perforations of the sieve to the portion that remains on top of the sieve.

(5) Consider all material that pass through the sieve as dockage. Pick out large material, such as pods and stems, from the lentils remaining on top of the sieve and add it to the dockage.

NOTE: If the 12/64-inch round-hole sieve is used and the sample contains small-seeded types, re-sieve the material in the bottom pan with the 9/64-inch round-hole sieve to reclaim all marketable lentils.

(6) Remove the dockage from the remainder of the representative portion in the same manner.

c. Dockage may also be removed from the lentils by using an FGIS approved dockage tester with the appropriate size sieve and a No. 6 riddle.

(1) Place the sieve in the top sieve carriage.

(2) Set the air to 9 and feed to 6.

(3) Put the sample in the feed hopper and actuate the tester.

(4) Return any lentils that pass over the riddle to the "cleaned" lentils.

NOTE: In some cases, it may be necessary to run the sample through the dockage tester two times. But, samples should never be run through the dockage tester more than two times.

(5) Consider all material that pass through the sieve and the material that pass over the riddle, except for lentils, as dockage.

d. Record the percent of dockage, with the size of sieve(s) used, on the work record and the certificate to the nearest tenth percent.

e. Upon request, determine (by handpicking the entire separation) or estimate the percent of small lentils, split lentils, and other material that comprise the dockage; i.e., a dockage breakdown.

(1) The breakdown of dockage may be estimated either by using hand sieves or by handpicking a representative portion of the dockage separation. Hand adjusting of the material through or over sieves is not required when the breakdown is estimated.

(2) Record the percent of small lentils, split lentils, and other material on the work record and the certificate to the nearest tenth percent. If an "estimated" dockage breakdown was performed, show the statement "Estimated using hand sieves" or, when handpicked, "(Estimated)," immediately following the results.

6.16 DEFECTIVE LENTILS

The categories of defective lentils shall be weevil-damaged lentils, heat-damaged lentils, damaged lentils, and split lentils.

The percentage of defective lentils and foreign material shall be combined and shown on the certificate as ATotal Defects and Foreign Material.@

a. Determine defective lentils on a representative portion of approximately 125 grams of dockage-free lentils.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of defective lentils on a representative portion of approximately 60 grams.

b. Score defects in the following order: Weevil-damaged, heat-damaged, damaged, and split lentils.

(1) Once an individual lentil is scored, do not score it for any other defect but retain it as part of the sample for purposes of determining the percentage of other defects in the sample.

(2) Record the percent of each type of defect and the percent of total defects and foreign material on the work record and the certificate to the nearest tenth percent.

c. Add the percentages of each type of defect and record the total percent of defective lentils on the work record and the certificate to the nearest tenth percent.

d. Add the percent of total defective lentils to the percent of foreign material and record the sum as "total defects and foreign material" on the work record and the certificate to the nearest tenth percent.

6.17 WEEVIL-DAMAGED LENTILS

Weevil-Damaged Lentils. Whole and pieces of lentils which are distinctly damaged by weevils or other insects.

a. Determine weevil-damaged lentils on a representative portion of approximately 125 grams of dockage-free lentils.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of weevil-damaged lentils on a representative portion of approximately 60 grams.

b. Consider as weevil-damaged:

(1) Lentils that contain or had contained a weevil, larva, or any other insect; and,

(2) Lentils that have been stung by weevils or other insects where the damage extends into the cotyledon and is of a size equal to or greater than that shown on ILS - Lentil 1.0.

NOTE: Lentils that have been "marked" by insects but where the sting does not penetrate the cotyledon, are not considered as weevil-damaged lentils.

c. Record the percent of weevil-damaged lentils on the work record and the certificate to the nearest tenth percent.

6.18 HEAT-DAMAGED LENTILS

Heat-Damaged Lentils. Whole and pieces of lentils which have been materially discolored as a result of heating.

a. Determine heat-damaged lentils on a representative portion of approximately 125 grams of dockage-free lentils.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of heat-damaged lentils on a representative portion of approximately 60 grams.

b. Lentils which have been materially damaged to an extent that the cotyledon has been discolored equal to or greater than that shown on ILS - Lentil 1.3 A (Seedcoat On) or 1.3 B (Seedcoat Removed).

c. Record the percent of heat-damaged lentils on the work record and the certificate to the nearest tenth percent.

6.19 DAMAGED LENTILS

Damaged Lentils. Whole and pieces of lentils which are distinctly damaged by frost, weather, disease, heat (other than to a material extent), or other causes, except weevil or material heat damage, or are distinctly soiled or stained by nightshade, dirt, or toxic material.

a. Determine damaged lentils on a representative portion of approximately 125 grams of dockage-free lentils.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of damaged lentils on a representative portion of approximately 60 grams.

(1) Frost Damaged Lentils. Lentils that have been damaged by frost to the extent that the cotyledon or seedcoat has been discolored equal to or greater than that shown on ILS - Lentils 1.2. Frost damaged lentils are usually characterized by a waxy textured cotyledon that may be yellow, green, or another color. Frost damaged lentils should not be confused with immature lentils or lentils that have naturally green-colored cotyledons.

(2) Insect-Stung Damaged. Lentils that have white "chalky" spots usually caused by Lygus bugs or similar insects. These spot were once thought to be caused by weathering. (See ILS - Lentils 1.0.)

(3) Mold Damaged Lentils. Lentils which contain surface mold equal to or greater than that shown on ILS - Lentil 1.5. (Lentils which contain any amount of mold on the cotyledon shall be considered to be damaged.)

(4) Damaged-By-Heat Lentils. Lentils which have been damaged by heat to the extent that the cotyledon has been discolored equal to or greater than that shown on ILS - Lentil 1.4 A (Seedcoat On) or 1.4 B (Seedcoat Removed).

(5) Sprout Damaged Lentils. Lentils which are sprouted and the sprout is equal to or greater than that shown on ILS - Lentil 1.6.

(6) Dirt and Grime Damaged Lentils. Lentils with dirt and grime (including nightshade juice) adhering to the seedcoat equal to or greater than that shown on ILS - Peas 1.1.

(7) Worm-Eaten or Worm-Cut Lentils. Lentils which have been chewed by insect larvae. Not to be confused with weevil-bored lentils containing insect webbing or filth. Any chewed lentil is considered damaged.

b. Record the percent of damaged lentils on the work record and the certificate to the nearest tenth percent.

6.20 SKINNED LENTILS

Skinned Lentils. Lentils from which three-fourths or more of the seedcoat has been removed.

a. Determine skinned lentils on a representative portion of approximately 125 grams of dockage-free lentils.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of skinned lentils on a representative portion of approximately 60 grams.

b. Skinned lentils shall be lentils that are scraped or skinned to an extent equal to or greater than that shown on ILS - Lentil 1.7.

c. Record the percent of skinned lentils on the work record and the certificate to the nearest tenth percent.

6.21 SPLIT LENTILS

Split Lentils. Pieces of lentils which are less than three-fourths of a whole lentil, and lentils in which the cotyledons are loosely held together.

a. Determine split lentils on a representative portion of approximately 125 grams of dockage-free lentils.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of split lentils on a representative portion of approximately 60 grams.

b. Record the percent of split lentils on the work record and the certificate to the nearest tenth percent.

6.22 FOREIGN MATERIAL

Foreign Material. All matter other than lentils, including detached seedcoats, which cannot be readily removed in the proper determination of dockage.

Stones. *Concreted earthy or mineral matter, and other substances of similar hardness that do not readily disintegrate in water.*

a. Determine foreign material on a representative portion of approximately 125 grams of dockage-free peas.

NOTE 1: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of foreign material on a representative portion of approximately 60 grams.

NOTE 2: Mud lumps or stones that are too large to pass through the sieve used in making the dockage determination should be handpicked from the lentils and added to the dockage. Mud lumps or stones that are approximately the size and shape of lentils, should be considered foreign material.

b. Record the percent of foreign material on the work record and the certificate to the nearest tenth percent.

6.23 INCONSPICUOUS ADMIXTURE

Inconspicuous Admixture. *Any seed which is difficult to distinguish from a lentil; including, but not limited to, Vicia sativa.*

a. Determine inconspicuous admixture on a representative portion of approximately 125 grams of dockage-free lentils.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of inconspicuous admixture on a representative portion of approximately 60 grams.

b. Record the percent of inconspicuous admixture on the work record and the certificate to the nearest tenth percent.

6.24 COLOR

Good Color Lentils. Lentils that in mass are practically free from discoloration and have the natural color and appearance characteristics of the predominating class.

Fair Color Lentils. Lentils that are not of good color.

a. Determine color on a representative portion of approximately 125 grams after the removal of dockage, defective lentils, and foreign material.

(1) Lentils shall be considered as "fair color" if they are not of a good natural color or are stained to an extent that seriously affect the appearance of the lot.

(2) Lentils that are discolored by dust or a slight amount of dirt, which can be removed by processing methods, shall not be considered as "fair color."

NOTE: One of the most common causes of discoloration of lentils is excessive heat, so-called "sunburned lentils" which are characterized by dark brown or reddish casts. Long storage may also produce discoloration and prevent the lentils from being considered of good color.

b. When thresher-run lentils are determined to be other than "good color," record this information on the work record and in the ARemarks@ section of the certificate.

6.25 BROKEN GLASS

a. Determine broken glass on the basis of the lot as a whole and/or the representative sample (before the removal of dockage) as a whole.

b. The presence of any broken glass, regardless of the size or amount, in the lot as a whole, work sample, or sample as a whole shall be sufficient evidence of broken glass.

c. When applicable, show the term "Broken glass" on the work record and in the ARemarks@ section of the certificate.

6.26 METAL FRAGMENTS

a. Determine metal fragments, such as metal filings or metal shavings, on the basis of the lot as a whole and/or the representative sample (before the removal of dockage) as a whole.

b. Sufficient evidence of metal fragments shall be:

(1) Two or more metal fragments in the lot as a whole or the work sample; or

(2) One metal fragment in the work sample and one or more in the file sample.

c. When applicable, show the term "Metal fragments" on the work record and in the ARemarks@ section of the certificate.

6.27 DISTINCTLY LOW QUALITY

Distinctly Low Quality. Whole lentils which are obviously of inferior quality because they are stained by an unknown foreign substance, or they otherwise contain a known toxic substance(s) or an unknown foreign substance(s), or because they are in an unusual state or condition, and which cannot be graded by use of the other grading factors provided in the standards.

a. Determine distinctly low quality on the basis of the dockage-free sample as a whole.

b. Lentils that are obviously affected by unusual conditions which adversely affect the quality of the lentils, such as animal excreta or other filth, unknown foreign substance, or treatment with a fungicide, shall be considered to be "distinctly low quality."

c. When applicable, show the statement "Distinctly low quality on account of (cause or reason)." on the work record and in the ARemarks@ section of the certificate.

6.28 INTERPRETIVE LINE SLIDES

The interpretive line slide (ILS) system assists inspectors in making subjective grading decisions. This system consists of a portable tabletop transparency viewer and photographic slide transparencies. The viewer uses a precisely controlled light source of low intensity designed to provide a standard picture and to protect the slide. Therefore, only use the special viewer for ILS. Other light sources, such as a regular slide projector, may provide a distorted picture and damage the ILS. Use of such a projector is not prohibited; but, once used in this manner, the slides may not be used for official purposes.

Table 3
Currently Available Interpretive Line Slides

LENTILS 1.0	DAMAGE - INSECT STUNG
PEAS 1.1	DAMAGE - DIRT AND GRIME
LENTILS 1.2	DAMAGE - FROST
LENTILS 1.3-A	HEAT DAMAGE - SEEDCOAT ON
LENTILS 1.3-B	HEAT DAMAGE - SEEDCOAT REMOVED
LENTILS 1.4-A	DAMAGED-BY-HEAT - SEEDCOAT ON
LENTILS 1.4-B	DAMAGED-BY-HEAT - SEEDCOAT REMOVED
LENTILS 1.5	DAMAGE - MOLD
LENTILS 1.6	DAMAGE - SPROUT
LENTILS 1.7	SKINNED